## Amendments to the Drawings

The attached eighteen sheets of drawings replace the existing drawing figures to place the drawings in proper form. Drawing sheet 3 includes changes to Figure 3. This sheet, which includes Figure 3, replaces the original drawing sheet 3 including Figure 3. Drawing sheet 12 includes changes to Figure 13. This sheet, which includes Figure 13, replaces the original drawing sheet 12 including Figure 13. Drawing sheet 16 includes changes to Figure 16b. This sheet, which includes Figure 16b, replaces the original drawing sheet 16 including Figure 16b.

Attachment: replacement sheet(s)

## Remarks and Arguments

Claims 1-48 have been presented for examination. Claims 1, 3, 5, 10, 14-19, 21, 23, 25-26, 28, 30, 32, 36, 41 and 45-48 have been amended.

The drawings were objected to under 37 C.F.R. §1.84(p)(5) because they included reference characters 122, 129m, 528, 908, 914 and 916 that were not mentioned in the specification. In response, the specification has been amended at paragraphs 23, 28, 57 and 71 to include mention of these latter reference characters.

In addition, the drawings were objected to because reference character "200" was used to reference both the "Bronze Quality Service Config. Policy" and the "Network." In response, Figure 3 was amended in the attached replacement sheets to change the reference character that references the "Bronze Quality Service Config. Policy" from "200" to "204" so that a single reference character refers to only one drawing element.

Figure 16b was objected to because the reference character 1052 had no line associating it with any drawing element. In response, Figure 16b has been amended to add such a line.

The specification was objected to because the reference character "129n" recited at page 12, line 23, did not appear in the drawings. In response, the specification was amended at paragraph 28 to change the reference character "129n" to "129m" which appears in Figure 2.

The specification was objected to because the reference character "200" recited at page 17, line 9, refers to a "network" whereas the same reference character appearing on page 18, lines 5 and 9 refers to a service configuration policy". In response, the specification was amended at paragraph 36 to change the reference character "200" to "204" which references the "Bronze Quality Service Config. Policy" element that appears in Figure 3.

The specification was objected to because the reference character "204" recited at page 17, line 9 and on pages 17 to 21 did not appear in the drawings. In response, the drawings were amended to include the reference character 204 on Figure 3.

The specification was also objected to because the reference character "816" recited at page 31, line 26, did not appear in the drawings. In response, the Figure 13 of the drawings was amended to include the reference character "816."

Claims 17 and 48 were objected to for a minor typographical error. In response, the typographical error has been corrected.

Claims 3, 5, 10, 14, 16, 19, 21, 23, 26, 28, 30, 36, 41, 45 and 47 have been rejected under 35 U.S.C. §112, second paragraph, for lack of proper antecedent bases and use of the indefinite word "if." In particular, claims 3, 19 and 26 were rejected for reciting "the at least one application" which lacks antecedent basis. In response, these claims have been amended to delete the word "the" so that they recite "at least one application." Thus, no antecedent is required. Similar changes were made in claims 19 and 26.

Claim 3 was also rejected for reciting "the at least one application host" which lacks antecedent basis. In response, this claim has been amended to delete the word "the" so that it recites "at least one application host." Thus, no antecedent is required.

Claims 15 and 46 were rejected for reciting "determining the additional resource allocation" which lacks antecedent basis. In response, these claims have been amended to change "determining the additional resource allocation" to "determining the modification of one at least one resource deployment or configuration" which finds antecedent basis in claim 1, lines 11-12 and claim 32, lines 12-13, respectively.

Claims 16 and 47 were rejected for reciting "the determined additional resource allocation" which lacks antecedent basis. In response, these claims have been amended to change "the determined additional resource allocation" to "the determined modification of one at least one resource deployment or configuration" which finds antecedent basis in claim 15, lines 4-5 and claim 46, lines 4-5, respectively.

Claims 5, 10, 14, 21, 23, 28, 30, 36, 41 and 45 were rejected for an indefinite use of the word "if". In response, the word "if" has been changed to "when" in these claims. Similar changes have been made to claims 1, 18, 25 and 32.

Claims 1, 2, 4, 7, 16, 18, 20, 25, 27, 32, 33, 35, 38 and 47 have been rejected under 35 U.S.C. §102(e) as anticipated by U.S. Patent Publication No. 2003/0055972

(Fuller.) The examiner comments that the Fuller reference discloses all of the claimed limitations.

The present invention is directed to a method and system for automatically maintaining a contracted level of service in a computer network. To this end, a plurality of service level parameters indicating the state of the system resources are measured and monitored in order to determine their values. Then, the service level parameter values are compared to predetermined service level thresholds in order to determine whether the contacted level of service is, in fact, being received. When the contracted service level is not being received, the system modifies one at least one resource deployment or configuration in order to bring the delivered service level into alignment with the contracted service level.

The Fuller reference discloses a storage virtualization system in which a shared storage infrastructure is separated by a virtualization layer into logical storage areas with one customer being associated with each logical area. The shared storage infrastructure can also provide policy based storage management for each customer. In particular, as set forth in Fuller paragraphs 36 and 37, a management server that is part of the storage infrastructure can store service expectancies and policies outlined in a service level agreement. The management server can configure the storage network (SAN) in order to realize the attributes of a customer's SLA. The management server can further analyze information collected by the SAN network regarding the operation, performance or health of the network in order to determine whether the terms of the SLA associated with a customer are. However, what is not disclosed in Fuller is modifying the network when the terms of the SLA are not being met. Instead, Fuller teaches notifying an administrator when the terms of the SLA are not being met, for example by illumination a warning icon. See, for example, Fuller, the last six lines of paragraph 37.

The examiner refers to Fuller paragraph 61, lines 9-14, as disclosing modification of the network when the terms of an SLA are not being met. However, this section of Fuller indicates that the system can automatically increase or decrease storage space when a customer has an SLA which specifies that the amount of storage space should

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change when the customer's _need_ changes (as determined by the system) not when the level of service is not being met.

The claims particularly point out this difference. For example, claim 1 recites, in lines 11-13, "...determining a modification of one at least one resource deployment or configuration when the value for the service level parameter for the resource does not satisfy the predetermined service level thresholds." As set forth above Fuller teaches notifying an administrator in this situation and, thus, is not automatic. Therefore, claim 1 patentably distinguishes over the cited _Fuller_ reference. Claim 18 contains similar limitations in lines 12-14 and claim 25 contains similar limitations in lines 16-19. Finally, claim 32 contains similar limitations in lines 12-14. Therefore, these claims also patentably distinguish over the cited _Fuller_ reference.

Claims 2, 4, 7 and 16 are dependent, either directly or indirectly, on claim 1 and incorporate the limitations thereof. Therefore, they distinguish over the cited reference in the same manner as claim 1.

Claim 20 is dependent on claim 18 and incorporates the limitations thereof. Therefore, it distinguishes over the cited reference in the same manner as claim 18.

Claim 27 is dependent on claim 25 and incorporates the limitations thereof. Therefore, it distinguishes over the cited reference in the same manner as claim 25.

Claims 33, 35, 38 and 47 are dependent, either directly or indirectly, on claim 32 and incorporate the limitations thereof. Therefore, they distinguish over the cited reference in the same manner as claim 32.

Claims 3, 19, 26 and 34 have been rejected under 35 U.S.C. §103(a) as obvious over _Fuller_ in view of U.S. Patent Publication No. 2002/0069377 (Mabuchi) and U.S. Patent No. 6,381, 637 (Kamada) and further in view of U.S. Patent No. 5,504,858 (Ellis.) The examiner comments that _Fuller_ discloses all of the claimed limitations with the exception that it does not explicitly disclose that the service level parameters include downtime, unavailability to applications and hosts, throughput and I/O transaction rate. However, the examiner asserts that _Mabuchi_ discloses monitoring the amount of time that a storage device is defective, _Kamada_ discloses unavailability and _Ellis_ discloses monitoring of request and data rates. The examiner concludes that it would have been

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obvious to combine <u>Fuller</u>, <u>Mabuchi</u>, <u>Kamada</u> and <u>Ellis</u> because they are all in the same field.

The <u>Mabuchi</u> reference discloses a disk array controller in which access timeout values are adjusted depending on whether all disks in the array are normal or some are defective. The <u>Kamada</u> reference discloses a mechanism for automatically tracing links on an Internet web page based on predetermined rules and parameters. The <u>Ellis</u> reference discloses a RAID storage system in which parity metadata is stored on each disk of the RAID array. The parity metadata identifies invalid parity blocks and prevents the generation of undetectable corrupt data. While <u>Mabuchi</u>, <u>Kamada</u> and <u>Ellis</u> disclose various aspects of system performance monitoring, none of the references is directed to the problem of service level monitoring and automatic reconfiguration of a system to achieve a contracted level. Thus, their combination with <u>Fuller</u> cannot teach or suggest modifying a resource deployment or configuration when a contracted level of service is not met an operation that, as discussed above, <u>Fuller</u> does not teach. Thus, the combination of <u>Fuller</u> with <u>Mabuchi</u>, <u>Kamada</u> and <u>Ellis</u> does not teach or suggest the limitations recited in the independent claims 1, 18, 25 and 32. Since claims 3, 19, 26 and 34 are dependent on claims 1, 18, 25 and 32, respectively, they distinguish over the cited combination of references in the same manner as the independent claims.

Claims 5, 6, 21, 28, 36 and 37 have been rejected under 35 U.S.C. §103(a) as obvious over <u>Fuller</u> in view of <u>Ellis</u>. The examiner comments that <u>Fuller</u> discloses all of the claimed limitations except that it does not disclose determining a time period during which the service level available to a customer does not satisfy the contracted service level parameters. However, the examiner asserts that Ellis discloses monitoring a data rate in a read/write operation and that it would have been obvious to combine <u>Fuller</u> and <u>Ellis</u> because both references are related to storage systems.

As discussed above <u>Ellis</u> is concerned with a RAID storage system and preventing the generation of undetectable corrupt data. Although <u>Ellis</u> may disclose various aspects of system performance monitoring, it is not directed to the problem of service level monitoring and automatic reconfiguration of a system to achieve a contracted level. Thus, its combination with <u>Fuller</u> cannot remedy the omissions of Fuller as discussed above. Thus, the combination of <u>Fuller</u> with <u>Ellis</u> does not teach or

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suggest the limitations recited in the independent claims 1, 18, 25 and 32. Since claims 5, 6, 21, 28, 36 and 37 are dependent on claims 1, 18, 25 and 32, respectively, they distinguish over the cited combination of references in the same manner as the independent claims.

Claims 8, 10, 12, 17, 22, 23, 29, 30, 39, 41, 43 and 48 have been rejected under 35 U.S.C. §103(a) as obvious over Fuller in view of U.S. Patent Publication No. 2003/0074599 (Golasky.) The examiner comments that Fuller discloses all of the claimed limitations except that it does not disclose determining which resource caused the service level to not meet the contracted level, determining if another resource of that type is available and, if so, allocating another resource to service the customer. However, the examiner asserts that Golasky discloses a system in which the failure of a resource causes another backup resource to be utilized and that it would have been obvious to combine Fuller and Golasky because both reference are related to storage systems.

The Golasky reference discloses a data backup system in which a failure of a logical unit in a storage device causes a backup agent to locate the backup copy of the data transfer the data to a spare logical unit in the storage device and remap the spare logical unit. The combination of Fuller and Golasky cannot teach or suggest the limitations recited in the claims because, as admitted by the examiner, Fuller does not teach determining if an alternate resource is available when a resource that caused the failure to meet contracted service level is identified. Golasky also does not disclose this step since Golasky is a backup system and a backup copy is always available. Thus, neither reference teaches or suggests "..determining whether any additional instances of the determined at least one resource that contributes to the failure of the service level parameter is available..." as recited in claim 8. Claims 10, 12 depend on claim 8 and incorporate the limitations thereof. Therefore, they distinguish over the cited combination of references in the same manner as claim 8. Claims 22, 29 and 39 contain limitations that parallel those in claim 8 and distinguish over the cited combination of references in the same manner as claim 8. Claims 23, 30, and 41 depend on claims 22, 29 and 39, respectively, and incorporate the limitations thereof.

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Therefore, they distinguish over the cited combination of references in the same manner as their respective parent claims.

In addition, Golasky is not directed to the problem of service level monitoring and automatic reconfiguration of a system to achieve a contracted level. Thus, its combination with Fuller cannot remedy the omissions of Fuller as discussed above. Thus, the combination of Fuller with Golasky does not teach or suggest the limitations recited in the independent claims 1, 18, 25 and 32. Since claims 8, 10, 12, 17, 22, 23, 29, 30, 39, 41 and 43 are dependent on claims 1, 18, 25 and 32, respectively, they distinguish over the cited combination of references in the same manner as the independent claims.

Claims 9 and 40 have been rejected under 35 U.S.C. §103(a) as obvious over Fuller in view of Golasky and further in view of Ellis. The examiner comments that Fuller and Golasky disclose all of the claimed limitations except that they do not disclose analyzing the resource deployment by using a bottleneck analysis. However, the examiner asserts that Ellis discloses that accessing a storage device can cause a bottleneck and that it would have been obvious to combine Fuller, Golasky and Ellis because these three references are related to storage systems. Fuller, Golasky and Ellis have been discussed above. It is noted that, although Ellis may mention that a bottleneck could be caused by disk access operations, it does not disclose analyzing the resource deployment by using a bottleneck analysis. Since the examiner admits that Fuller and Golasky also do not teach this limitation, the claims patentably distinguish over this combination of references.

In addition, neither Golasky nor Ellis is directed to the problem of service level monitoring and automatic reconfiguration of a system to achieve a contracted level. Thus, their combination with Fuller cannot remedy the omissions of Fuller as discussed above. Thus, the combination of Fuller, Golasky and Ellis does not teach or suggest the limitations recited in the independent claims 1 and 32. Since claims 9 and 40 are dependent on claims 1 and 32, respectively, they distinguish over the cited combination of references in the same manner as the independent claims.

Claims 11 and 42 have been rejected under 35 U.S.C. §103(a) as obvious over Fuller in view of Golasky and further in view of Ellis and U.S. Patent No. 6,301,605

(Napolitano) and U.S. Patent No. 5,956,750 (Yamamoto.)  The examiner comments that Fuller and Golasky disclose all of the claimed limitations except that they do not expressly disclose specific access characteristics including read/write ratio, input/output size, and percentage of sequential or random accesses.  However, the examiner asserts that Ellis discloses the measurement of read/write ratios, Yamamoto discloses measuring the percentage of sequential or random accesses and Napolitano discloses that file size can be monitored in I/O transactions.

Napolitano discloses a distributed file system in which the input/output subsystem for the file system is located entirely on an adapter coupled to a host computer.  Thus, the distributed file system consists of a client file system executing on the host computer and a server file system executing on the adapter.  Yamamoto discloses a storage controller in which logical drives are reallocated to physical devices depending on the disk access frequency for load balancing purposes.

Since neither Ellis, Napolitano or Yamamoto is directed to the problem of service level monitoring and automatic reconfiguration of a system to achieve a contracted level, their combination with Fuller and Golasky cannot remedy the omissions of Fuller as discussed above.  Thus, the combination of Fuller, Golasky, Ellis, Napolitano and Yamamoto does not teach or suggest the limitations recited in the independent claims 1 and 32.  Since claims 11 and 42 are dependent on claims 1 and 32, respectively, they distinguish over the cited combination of references in the same manner as the independent claims.

Claims 13, 24, 31 and 44 have been rejected under 35 U.S.C. §103(a) as obvious over Fuller in view of U.S. Patent No. 6,006,251 (Toyouchi.)  The examiner comments that Fuller discloses all of the claimed limitations except that it does not disclose that applications in the system can be assigned a priority and that changing the deployment of resources to meet contracted service levels can include changing the priority of applications.  However, the examiner asserts that the Toyouchi reference discloses dividing information requests into priority groups and changing priorities based on a relationship to a parameter.

The Toyouchi reference discloses a client server system in which a "service computer" is interposed between the existing clients and servers.  The service computer

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receives service requests from the clients and directs the requests to the proper servers, thereby increasing the efficiency of the overall system.

The Toyouchi reference is not directed to the problem of service level monitoring and automatic reconfiguration of a system to achieve a contracted level and, thus, its combination with Fuller cannot remedy the omissions of Fuller as discussed above. Thus, the combination of Fuller and Toyouchi does not teach or suggest the limitations recited in the independent claims 1, 25 and 32. Since claims 13, 24, 31 and 44 are dependent on claims 1, 25 and 32, respectively, they distinguish over the cited combination of references in the same manner as the independent claims.

Claims 14 and 45 have been rejected under 35 U.S.C. §103(a) as obvious over Fuller in view of Toyouchi and further in view of Golasky The examiner comments that Fuller and Toyouchi disclose all of the claimed limitations with the exception that they do not disclose analyzing a resource deployment in order to determine which resource caused the service level to not meet the contracted level, determining if another resource of that type is available and, if so, allocating another resource to service the customer. However, the examiner asserts that Golasky discloses a system in which the failure of a resource causes another backup resource to be utilized and that it would have been obvious to combine Fuller, Toyouchi and Golasky because all of these references are related to storage systems.

As discussed above, Golasky does not disclose determining if another resource of that type is available, since Golasky is a backup system and a backup copy is always available. Thus, none of the references teach or suggest "..determining whether any additional instances of the determined at least one resource that contributes to the failure of the service level parameter is available..." as recited in claims 14 and 45. Therefore these claims distinguish over the cited combination of references.

In addition, also as mentioned above, Golasky is not directed to the problem of service level monitoring and automatic reconfiguration of a system to achieve a contracted level. Thus, its combination with Fuller and Toyouchi cannot remedy the omissions of Fuller as discussed above. Thus, the combination of Fuller, Toyouchi and Golasky does not teach or suggest the limitations recited in the independent claims 1 and 32. Since claims 14 and 45 are dependent on claims 1 and 32, respectively, they
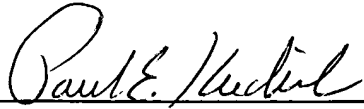
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distinguish over the cited combination of references in the same manner as the independent claims.

Claims 15 and 46 have been rejected under 35 U.S.C. §103(a) as obvious over Fuller in view of U.S. Patent Publication No. 2001/0044907 (Yoshimoto.) The examiner comments that Fuller discloses all of the claimed limitations with the exception that they do not disclose that a service level parameter that could cause the service level to fall below the contacted value could be an input/output throughput parameter. However, the examiner asserts that Yoshimoto discloses a system that monitors input/output throughput and that it would have been obvious to combine Fuller and Yoshimoto because all of these references are related to storage systems.

The Yoshimoto reference discloses a computer system that has a power saving mode. The patent is specifically directed to determining the period of periodic disk accesses so that the system can be placed in power saving mode during the time between accesses. As with the other cited prior art references it has nothing directly to do with the problem of service level monitoring and automatic reconfiguration of a system to achieve a contracted level. Thus, its combination with Fuller cannot remedy the omissions of Fuller as discussed above. Thus, the combination of Fuller and Yoshimoto does not teach or suggest the limitations recited in the independent claims 1 and 32. Since claims 15 and 46 are dependent on claims 1 and 32, respectively, they distinguish over the cited combination of references in the same manner as the independent claims.

In light of the forgoing amendments and remarks, this application is now believed in condition for allowance and a notice of allowance is earnestly solicited. If the examiner has any further questions regarding this amendment, he is invited to call applicants' attorney at the number listed below. The examiner is hereby authorized to charge any fees or direct any payment under 37 C.F.R. §§1.17, 1.16 to Deposit Account number 02-3038.

Respectfully submitted

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